A Work Project, presented as part of the requirements for the Award of a Masters Degree in Management from the NOVA – School of Business and Economics**.**

FACTORS INFLUENCING THE ADOPTION AND IMPLEMENTATION OF COSTING SYSTEMS IN NON-FINANCIAL COMPANIES OPERATING IN THE PORTUGUESE AND SOUTH AFRICAN MARKETS.

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Abstract

This is a survey-based work project with the purpose of identifying which costing systems are adopted/implemented by the largest non-financial companies in Portugal and South Africa, as well as the most influential contextual, organizational and technical factors in such adoption/implementation. Contextual factors as company size, cost structure, importance of cost information, service sector and national culture were found statistically significant. Regarding organizational and technical factors, the most relevant are difficulty in collecting required data and not meeting cost-benefit criteria. This WP provided direction for further research devoted to understand factors that influence the adoption and implementation of costing systems.

Keywords: Costing systems, non-financial companies, Portugal and South Africa

I. Purpose of the work project:

The impact of global competition and recent economic downturn in the companies' performance has increased the need for more accurate cost data in their strategic and operational decisions. The adoption/implementation of the right costing system is, thus, crucial e.g. to pinpoint loss-making activities or to reduce errors in costing products/services which could negatively affect the companies' performance and subsequently, the economy health (Drury, 2012). The design of such system differs across business sectors, which makes companies operating in different sectors an interesting target to study (Al-Omiri & Drury, 2007; Fisher & Krumwiede, 2012). Moreover, contingency theory advocates that the adoption and design of costing systems is influenced by contextual factors[1] (Chenhall, 2003; Al-Omiri & Drury, 2007),

[1] Such as the importance of cost information, intensity of competition and size of the company.

and according to Fei & Isa (2010) and Lui & Pan (2007) the implementation of such costing systems may be undermined by organizational[2] and technical factors[3].

However, prior research studies on the topic of this work project (WP): 1) shows contradictory empirical findings regarding the influence of contextual factors; 2) produced few comparative analysis between countries therefore omitting a contextual factor - national culture (Chenhall, 2003); 3) also omitted other factors such as organizational and technical factors (see for instance Al-Omiri & Drury, 2007, Ahamadzadeh et al., 2011 and Gomes, 2004); and 4) lacks detailed analysis on the importance of cost information. Thus, the purpose of the present WP is to fill these gaps, by firstly drawing on the four proxy measures used by Al-Omiri & Drury (2007) to appropriately identify the level of costing system sophistication; secondly, assessing the association between the level of costing system sophistication[4] and contextual factors in the adoption/design phase, as well as assessing in detail the importance of cost information for internal purposes; thirdly, extending contingency-based research through a comparative analysis of this WP's findings in the largest non-financial companies operating in Portugal and South Africa; and finally, identifying the organizational and technical factors that are more relevant in the implementation phase (Abernethy, et al., 2001; Lui & Pan, 2007).

South Africa and Portugal were selected for several reasons. Portugal needs to increase its exports by diversifying markets in order to consolidate a positive trade balance, as well as its presence in Africa (Trading Economics, 2013). According to the Vice-President of Câmara de Comércio e Indústria Luso Sul Africana, South Africa is a potential trading partner for Portuguese companies as it is the biggest (its GDP represents 19% of Africa's GDP and almost double of Portugal's GDP- see Appendix I**)**

[2] Such as lack of top management support during the implementation.
[3] Such as lack of appropriate software to support the implementation of the costing system.
[4] Number of cost centres, cost drivers , ABC or TCS, Direct or Absorption costing systems.

and the most diversified African economy. Additionally, it became a state member of Southern African Development Community, which not only turned South Africa into a strategic gateway for many foreign companies that wanted to consolidate their position in Africa, but also posed a threat to Portuguese companies in markets such as Angola and Mozambique where they will face increased competition from South African companies in the next years (Oliveira, 2013). According to Campos (2012), Caroline Henry a manager of South African energy company (Eskom) emphasized that one of South Africa objectives is to reduce its 70% dependence of energy on coal which triggered the interest of Portuguese companies. Due to this huge opportunity identified from both sides, there has been an intensive economic diplomacy between Portuguese Embassy, AICEP and Gauteng Growth and Development Agency which increased Portuguese presence in South African market through exports (+ 79,3% from Jan to Aug 2013), FDI, participation in public tenders, partnerships in the sectors of telecommunication and renewable energies (O Século, 2013a; O Século, 2013b, Campos 2012). All these reasons were seen as interesting to study if potential trading partners in South Africa and Portugal adopt similar costing systems.

This report continues as follows: Section II reviews the literature on the main costing systems and the influence of contextual, organizational and technical factors on the adoption/implementation of such systems and then hypothesis are formulated. In Section III the research methodology followed in this WP is presented. Section IV depicts its main findings and Section V discusses them and concludes.

II. Literature Review, Research Questions and Hypothesis:

A costing system is more or less sophisticated depending on how and which costs it assigns to products, services or other cost objects. Direct costing, where only direct costs are assigned, is the least sophisticated costing system (henceforth SCS), and very

often inappropriate for decision-making as well as not accepted by Generally Accepted Accounting Principles. Where direct and indirect costs are assigned to products/services (definitions in Appendix II, Q8), an absorption costing system is adopted (Fisher & Krumwiede, 2012; Al-Omiri & Drury, 2007; Ahamadzadeh et al., 2011). The level of costing system sophistication is also determined by another two measurements: the number of cost centers set up (where indirect costs are accumulated e.g. departments or activity cost centers) and 2nd stage cost drivers [5] (e.g. allocation rates). Thus, a costing system with multiple costs centers and cost drivers is classified as a SCS[6], because it better captures the variation of resource consumption as well as the cause-and-effect relationship between resource consumption, activities (e.g. setting up machines) and cost objects (Al-Omiri & Drury, 2007; Horngren et al., 2012). And the last measurement of the level of costing system sophistication is the nature/type of cost centers and cost drivers, resulting into two categories (see Q16 in Appendix II for definition of different costing systems): ABC (activity-based costing system) and non-ABC adopters, where the latter more often use TCS (traditional costing systems).

TCS were conceived when the business environment was characterized by mass production of a narrow range of products, high direct costs and the main purpose of costing systems was to value inventory for external reporting (Al-Omiri & Drury 2007; Chea, 2011; Fisher & Krumwiede, 2012; Drury, 2012; Horngren et al., 2012). However, the business environment has changed due to global competition, advanced technology and demand for product diversity which shortened product life cycles. This change increased indirect costs as larger spending in R&D, distribution, marketing and capital investments started to occur (Gomes, 2004, Horngren et al., 2012; Rebelo, 2010; Elhamma & Fei, 2013), and also increased the need of accurate cost information for

[5] Work/volume of departments/activities consumed by products/services (e.g. see Appendix II, Q13).
[6] For instance, Al-Omiri & Drury (2007) classified costing systems with more than 11 cost centers and more than 4 cost drivers as SCSs (e.g. sophisticated costing systems).

internal reporting. Under such contextual factors, TCS would report cost distortions and lead to wrong decisions, therefore ABC was developed. Whereas TCS use mostly volume-based cost drivers (e.g. machine hours), ABC uses them to assign the costs of unit-level activities (performed any time a unit of product or service is produced), and uses non-volume cost drivers (e.g.: number of machines' set up) to assign the costs of batch-level (performed any time a batch of products or services has to be produced) or of product/service sustaining level activities to cost objects (Drury, 2012; Noreen et al., 2009; Gomes, 2004). Yet, previous studies reported low adoption rate for ABC: 22% in Portugal (Tomás, et al., 2008); 12% in South Africa (Sartorius, et al., 2007) and 15-29% in UK (Drury & Tayles 2006; Al-Omiri & Drury 2007). This was explained, in some cases, by the difficulty in implementing ABC while in others ABC implementation was stopped right after the activity analysis phase and the information gathered was just used to improve the existing TCS (Ratnatunga et al., 2012; Gosselin, 1997).

Therefore another SCS, Time-driven ABC (TDABC), was developed more recently. It distinguishes from ABC as the latter relies on employee's interviews to assess time spent in the activities performed, while TDABC does not assume that resources are used at full capacity (e.g. employee working 8h with no breaks), thereby, only allocating resources that are actually consumed. With TDABC, managers can identify unused capacity as a potential area for cost cutting and avoid unnecessary capacity expansion (Kaplan & Anderson, 2004; Demeere, et al., 2009; Everaert & Bruggeman, 2007).

The four proxy measurements mentioned earlier in this section, provide basis for answering the first research question of this WP "What is the level of sophistication of the costing systems adopted/implemented by the targeted companies?"

The adoption/implementation of an optimal costing system differs across companies since it depends on contextual, organizational and technical factors (Fei & Isa, 2010). But, up to now, findings from contingency-based research have not been consistent as

some studies reported no association between adoption of a SCS and cost structure (Al-Omiri & Drury, 2007; Drury & Tayles, 2005; Abernethy et al., 2001), product diversity (Al-Omiri & Drury, 2007; Abernethy et al., 2001; Askarany et al, 2009), company size (Baird et al., 2004; Gosselin, 1997; Costa, 2013; Ahamadzadeh et al., 2011), intensive competition (Costa, 2013; Drury & Tayles, 2005) and the business sector (Tomás et al., 2008). In contrast, others studies reported strong association between a SCS and: 1) the importance of cost information (Al-Omiri & Drury, 2007); 2) intensive competition and company size (Al-Omiri & Drury, 2007; Sartorius, et al., 2007); 3) product diversity (Drury, 2012; Gomes, 2004) and cost structure (Gomes, 2004; Sartorius, et al., 2007; Ahamadzadeh et al., 2011). So, a second research question was formulated: "Which are the most influential/relevant factors that determined the level of sophistication of the costing systems during the adoption and implementation phase?[7]"

The importance of cost information for decision-making was found to be one of the most influential contextual factor across many contingency-based research (Al-Omiri & Drury, 2007; Ahamadzadeh et al., 2011; Baird et al, 2004; Costa, 2013) in the adoption phase of a SCS (e.g ABC and TDABC). Accurate cost information is essential to support strategic decisions such as: 1) selection of optimal product mix or planning/launching a new product design with less costs; and 2) pricing decisions such full cost-plus pricing adopted by price setters. These are market leaders and/or companies selling highly customized products/services where their direct costs have to be added to allocated overheads costs and a profit markup (Drury, 2009; Chea, 2011; Atkinson et al., 2012; Noreen et al., 2009; Innes & Mitchell, 1999; Fisher & Krumwiede, 2012; Sartorius et al., 2007; Taba, 2007). Therefore, the following hypothesis (**H1)** is tested: There is a positive association between the importance of cost information for internal purposes and the level of sophistication of costing systems.

[7] Nine hypothesis were formulated in order to assess the association of contextual factors with the level of sophistication of costing systems during the adoption phase.

According to Schoute (2009), the cost information extracted from ABC is extremely useful for operational decisions (e.g. cost reduction and redesign of processes) as it provides a clear and accurate picture of the business processes/activities, enabling effective elimination of non-value added activities and increase of efficiency. Innovative management accounting techniques such as value chain analysis (Wei, 2010; Fisher & Krumwiede, 2012), supply chain management (Askarany et al., 2009; Baykasoglu & Kaplanoglu, 2008), total quality management (TQM) and target costing (see Appendix III) rely on the ABC information to support operational decisions (Atkinson, et al., 2012; Noreen et al., 2009; Innes & Mitchell, 1999; Drury, 2009; Fei et al., 2008). Therefore **H2** is tested: There is a positive association between SCSs and innovative management accounting techniques.

Product diversity, when high, increases the chances of cost distortions because production differs in volume and support processes, thus, consuming batch-level activities differently. A SCS is more appropriated in these circumstances as it captures the variation in resource consumption and reduces mistakes such as cost cross-subsidization between low volume/high complexity products (undercosted) and high volume/low-complexity products (overcosted). If these mistakes are not avoided, profits and market share will tend to decrease in the long-run as companies keep on selling unprofitable products and discontinuing profitable ones (Atkinson, et al.,2012; Fei & Isa, 2010; Al-Omiri & Drury 2007; Horngren et al., 2012; Ratnatunga et al., 2012; Ahamadzadeh et al., 2011). So **H3** follows: Higher levels of product diversity are associated with more SCSs. Additionally, demand for product diversity increased the proportion of indirect/overhead costs, mainly non-volume-based overheads (derived from batch-level and product/service sustaining activities such as R&D, design and marketing), which are misallocated by volume-based costing systems such as TCS (Drury, 2012; Fei & Isa, 2010; Al-Omiri & Drury, 2007; Rebelo, 2010; Ahamadzadeh

et al., 2011). Therefore, **H4** is tested: The higher the proportion of indirect costs not directly related to production volume in the companies' cost structure, the higher the level of sophistication of the costing system adopted.

Technological advancements reduced costs and time involved in the implementation of SCSs, by facilitating the identification of cost drivers, business process mapping (Al-Omiri & Drury, 2007; Sartorius, et al., 2007; Ratnatunga et al., 2012). Therefore, **H5** is tested: Technological advancement facilitates the adoption/implementation of SCSs.

SCSs have been extensively used by large firms, because these have more diversified activities that need to be coordinated and can access the required resources for the implementation of such systems (Fei & Isa, 2010; Ahamadzadeh et al., 2011; Baird et al., 2004). Therefore **H6** is tested: Large companies are more likely to adopt SCSs.

Companies facing a competitive environment seek for survival strategies which, according to Porter (1985), can be of cost leadership (selling products/services at low prices by carefully managing their costs), differentiation (selling unique/innovated products/services at premium price) or focus, and for which accurate cost data is needed (Elhamma & Fei, 2013; Drury, 2012; Horngren, et al. 2012; Gosselin, 1997). Therefore **H7** is formulated: The more intense is competition, the more SCSs.

Regarding business sector, not only its characteristics influences the level of sophistication of the costing system adopted (Al-Omiri & Drury, 2007; Askarany et al, 2009), but also companies tend to replicate those systems mostly used in their business sector. This happened in the manufacturing sector (pioneer in adopting ABC), and now in the service sector, which shows higher adoption rate (Ahamadzadeh et al., 2011; Chea, 2011; Demeere, et al., 2009; Everaert & Bruggeman, 2007). Thus **H8** follows: The level of sophistication of a costing system differs across business sectors.

The last contextual factor assessed in this WP is national culture, which can be characterized by five dimensions: uncertainty avoidance (where managers prefer more

accurate information for decision-making and consequently are more likely to adopt ABC); power-distance (where decision-making is concentrated at the top level and possibly undermining ABC implementation); masculinity/femininity (where in masculinity cultures career success and goal achievement are more valued than quality of life, which is more valued by femininity cultures); individualism/collectivism (in individualistic societies managers are less likely to engage in cross-functional teams, which possibly undermines ABC implementation, in contrast with collectivist cultures which facilitate ABC implementation); and Confucian dynamism (which refers to long-term goal oriented societies, which are more likely to adopt ABC than short-term goal oriented) (Hofstede, 1984; Choe & Langfield-Smith, 2004). The last hypothesis tested is **H9**: National culture influences the level of sophistication of costing system.

Finally and as already mentioned, previous research reported low adoption rate of SCSs due to organizational and technical factors that may have undermined SCSs' implementation phase (see Q20 in Appendix II, the factors considered in this WP) (Drury, 2012; Sartorius et al., 2007; Janse van Rensburg & Jassat, 2011; Ratnatunga et al., 2012; Horngren et al., 2012; Taba, 2007; Atkinson, et al., 2012; Fei & Isa, 2010).

III. Methodology

A quantitative research method was used to answer the two research questions of this WP and, subsequently, to test the nine hypotheses drawn from contingency theory-inspired accounting studies. Therefore data was collected through an exploratory survey, e.g: an online Qualtrics questionnaire, addressed to CFOs and Controllers of targeted non-financial companies operating in Portugal and South Africa (Ferreira & Sarmento, 2009; Van der Stede et al. 2005; Yin, 2009). The CFOs and Controllers' contacts of the Portuguese companies were collected from Informa D&B database while those from South African companies by phone.

A sampling procedure was rejected in favor of the entire population accordingly to Van der Stede et al. (2005)'s suggestions to increase the response rate as much as possible without discriminating potential respondents and to avoid risks of sampling error. The targeted population was based on the *Revista Exame* ranking *"500 Maiores e Melhores Empresas de Portugal em 2011"* and the *African Report* ranking of the 2011 results of *"Africa´s Top 500 Companies"*[8]. These rankings listed companies with annual sales turnover higher than $78 million, which enabled the assessment of the influence of company size on the level of costing system sophistication.

The overall structure of the questionnaire was based on MaIhotra (2009), and some specific questions followed the structure and content of Drury & Tayles (2005)'s questionnaire as it was consistent with Al-Omiri & Drury (2007)'s suggestion on how to best measure the dependent variable (level of sophistication of the costing system), as well as some contextual factors. Therefore, the dependent variable was firstly measured through a dichotomous question (Q10 in Appendix II) to distinguish absorption costing systems' adopters from direct or no formal costing systems' adopters, then through a categorical question (Q16 in Appendix II) which enabled the development of the binary dependent variable ABC (including TDABC) and non-ABC adopters (TCS) and lastly through two questions with numerical scale (eight-point Likert scale/log2 N scale) to determine the level of sophistication of costing system (Q12 and Q13 in Appendix II). For most independent variables, the measurement instrument used was a seven-point Likert-type scale in order to assess the association between contextual, technical and organizational factors with the costing system designed and implemented.

Following Ferreira & Sarmento (2009) and Van der Stede et al. (2005)' s indications, the questionnaire was pre-tested with an academic from management accounting field and two from statistics, as well as with two practitioners randomly selected from the

[8] Of which 172 are South African/non-financial companies (Ware, 2013).

targeted population in Portugal and South Africa. An introductory letter explaining the purposes of the WP and guaranteeing confidentiality was included in the online questionnaire addressed to the target population (see Appendix II). Follow-up procedures started 2 weeks after due to low response rate which finally reached 11% (56 companies) for Portugal and 20% (34) for South Africa. Regarding survey data analysis, statistical software SSPS (Statistical Package for Social Science) was used for descriptive statistics and regression analysis (Ferreira & Sarmento, 2009; MaIhotra, 2009) in order to test the hypotheses of this WP. The results were reviewed with a professor of econometrics and statistics.

IV. Research Findings

An internal consistency/reliability test was conducted for the Likert-type scale questions of the survey. Table 1 shows that Cronbach's Alphas for most of the independent variables are acceptable as alpha values fall between 0.71- 0.85, except for innovative management accounting techniques and product diversity (where alphas < than 0.6, thus below the minimum acceptable level). This may be due to different opinions regarding these two contextual factors (Pestana & Gageiro, 2008).

Table 1: Cronbach's Alpha of independent variables

Independent variables	Number of questions used	Cronbach's Alpha
Business Sector	1	Objective measure
Size (sales turnover)	1	Objective measure
Cost Structure	1	Objective measure
Product diversity	2	0.512
Intensity of competitive env.	2	0.772
Importance of cost info	8	0.801
Innov. Manag. Acc. Tech	6	0.520
Contextual factors	8	0.823

Concerning descriptive statistics, Table 2 presents the average percentage of cost structure breakdown by business sector grouped into four categories[9]. Manufacturing sector companies from both countries show high percentage of direct costs, while service sector companies have the highest percentage of indirect costs. In South Africa, the highest percentage of direct costs is in companies operating in the retail sector (78%) while in Portugal this happens in the resources sector (76%).

Table 2: Cost structure

Cost Structure (%)	Country	Resources	Manufacturing	Retail	Services
Direct materials	South Africa	21%	38%		
	Portugal	59%	52%		
Direct labor	South Africa	20%	16%		
	Portugal	13%	17%		
Direct non-manufacturing cost	South Africa	8%	10%		
	Portugal	4%	6%		
Indirect manufacturing costs	South Africa	35%	19%		
	Portugal	13%	15%		
Indirect Non-manufacturing costs	South Africa	16%	17%		
	Portugal	11%	10%		
Total direct costs	**South Africa**	**49%**	**64%**	**78%**	**39%**
	Portugal	**76%**	**75%**	**64%**	**56%**
Total indirect costs	**South Africa**	**52%**	**36%**	**22%**	**61%**
	Portugal	**24%**	**25%**	**36%**	**44%**

The first research question is answered by Tables 3 and 4 which then compared with Appendix IV enabled more conclusive result. Therefore the level of sophistication of costing systems[10] adopted/implemented by companies presented in Table 4, indicates that TCS have the highest presence in manufacturing sector companies in both countries. In fact, 23 out of 31 respondents (74%) from manufacturing sector companies in Portugal and South Africa still rely in TCS, which represents 25% of the total respondents (90). In contrast ABC and TDABC have the highest incidence in the

[9] Resources (mining and energy); Manufacturing (including civil construction); Retail (including IT retailers) and Services (healthcare, consulting, transportation and logistics, telecommunication , publishing and media, IT service).

[10] Measured by first stage allocation process, nature/type of cost centers and cost drivers.

service sector. In the 40 service sector companies from both countries that participated in the online survey, 65% have adopted/implemented these two SCSs, representing 29% of the total respondents (90). This confirms prior research (Ahamadzadeh et al., 2011 and Chea, 2011, among others). Regarding retail sector companies, most rely on TCS while resources sector companies tend to adopt more SCSs. Despite TCS are still being broadly used in both countries, Table 3 shows that the largest the company the most likely it is to adopt/implement ABC and TDABC

Table 3: Costing systems by sales turnover

Sales Turnover $	South Africa				Portugal				Total N (%)
	TCS	ABC	TDABC	No formal costing system	TCS	ABC	TDABC	No formal costing system	
<78M	2	---	1	1	1	1	1	1	8 (8,9%)
78M - 300M	2	1	---	---	7	1	---	3	14 (15,6%)
300M - 500M	1	---	---	---	11	4	1	---	17 (18,9%)
500M - 1B	6	3	1	---	3	6	4	---	23 (25,5%)
> 1 B	6	7	1	2	4	7	1	---	28 (31,10%)
Total N (%)	17[a] (50%)	11[a] (32,4%)	3[a] (8,8%)	3[a] (8,8%)	26[b] (46,4%)	19[b] (33,9%)	7[b] (12,5%)	4[b] (7,1%)	90 (100%)

[a]N = 34 [b]N = 56

Table 4: Costing systems by business sector

Business Sector	South Africa				Portugal				Total N (%)
	TCS	ABC	TDABC	No formal costing system	TCS	ABC	TDABC	No formal costing system	
Resources	2	3	1	---	3	2	---	---	11 (12,2%)
Manu.	10	3	---	---	13	2	1	2	31 (34,4%)
Retail	3	---	---	1	2	2	---	---	8 (8,0%)
Services	2	5	2	2	8	13	6	2	40 (44,4%)
Total N (%)	17[a] (50,0%)	11[a] (32,4%)	3[a] (8,8%)	3[a] (8,8%)	26[b] (46,4%)	19[b] (33,9%)	7[b] (12,5%)	4[b] (7,1%)	90 (100%)

[a]N = 34 [b]N = 56

The two previous tables reveal that the adoption/implementation rate of each costing system does not differ significantly between the two countries. Therefore, from the 90 survey respondents, only 7 (8%) do not have a formal costing system whereas all the others adopted an absorption costing system with the following category and rate: TCS 47%, ABC 33%, TDABC 11%.

The level of sophistication of the above costing systems was also determined by cross tabulation of the number of cost centres and cost drivers presented in Appendix IV, with SCSs adopters identified in the shaded area. So, 21 out of 31 South African companies that adopted absorption costing systems are SCSs' adopters (68%) versus 38 out of 52 (73%) in Portugal. Note that the total SCSs adopters in the shaded area exceed the number of ABC and TDABC adopters shown in Table 3 and 4, which indicates that some TCS must also be seen as SCSs.

In order to test the hypothesis specified in section II, three regression models were developed. In the first, which applies binary logistic regression, the dependent variable (Y), determined by a categorical question (Q16, Appendix II), assumes two values: one if ABC adopter[11] and zero if non-ABC adopter. The logistic regression model, which follows, consists of 12 independent variables (contextual factors including 5 dummy variables) and tests their influence over the dependent variable:

$$Y=b_1+ b_2\text{compet} + b_3\text{sector} + b_4\text{tech} + b_5\text{size} + b_6\text{prodiv} + b_7\text{indcost} + b_8\text{costinfo} +$$

$$b_9\text{Res} + b_{10}\text{Manu} + b_{11}\text{Retail} + b_{12}\text{Serv} + b_{13}\text{Coun} + e$$

where the contextual factors taken into account are: compet: intensity of competitive environment; sector: replication of costing systems within business sectors; tech: technological advancement; size: company size measured by annual sales turnover; prodiv: product diversity; indcost: percentage of indirect costs; costinfo: importance of cost information; Res: resources; Manu: manufacturing; retail: retail; Serv: service;

[11] TDABC adopters were included under ABC category and TCS adopters under non-ABC category.

Coun: country, with the latter five factors being all dummy variables[12]. The contextual factor "innovative management accounting techniques" was excluded from the analysis as the output of Spearman's correlation matrix table (Appendix V) indicated that it was highly correlated with three of the contextual factors taken into account.

Table 5: Logistic regression analysis (Model 1)

Contextual Factors	***B*(Logistic coefficient)**	**Standard error**	**p-values**	**Collinearity statistics**	
				tolerance	**VIF**
Intensity of competitive environment	.178	.261	.496	.610	1.640
Business sector (Costing system replication)	-.612	.370	.098	.624	1.604
Technological advanc.	-.367	.319	.250	.536	1.866
Company size (annual sales turnover)	.920	.414	.026	.760	1.316
Product Diversity	.248	.232	.286	.626	1.598
Cost Structure (% of indirect costs)	.768	.294	.009	.739	1.353
Importance of cost information	.952	.310	.002	.723	1.382
Resource dummy variable	.559	1.308	.669	.689	1.574
Manu/const.dummy variable	-1.159	1.185	.328	.724	1.466
Retail dummy variable	-1.762	1.450	.224	.568	1.761
Service dummy variable	2.479	1.201	.039	.568	1.740
Country dummy variable	2.415	1.205	.045	.630	1.587
Constant	-9.974	3.296	.002		
Chi-square	59.440		.000		
Hosmer and Lemeshow goodness of fit			.396		
Nagelkerke R square			.678		

Considering the results of Table 5, the contextual factors statistically significant in the adoption ABC system are: Company size ($p<.05$), Cost Structure ($p<.01$), Importance of cost information ($p<.01$), Service dummy variable ($p<.05$) and Country dummy variable ($p<.05$). Therefore the logistic regression model becomes:

ABC = -9.974+ .920size + .768indcost + .952costinfo+ 2.479Serv + 2.415Coun

[12] Assuming the value one if Portugal and zero if South Africa.

which is statistically significant as indicated by the Chi-square value of 59.440 with a p-value of .000 in Table 5. The Nagelkerke R square indicates that 67.8% of the variation in the dependent variable (Y) is explained by the variation in the independent variables (logistic regression model). Hosmer and Lemeshow statistic has a non-significance outcome of .396, which means that the observed values do not significantly differ from the predicted values of the model and therefore the model is good fit (Burns, 2008). From the 83 adopters of absorption costing system, 4 were missing cases (respondents that failed to complete questions, e.g. Q4, Q14, were excluded from the analysis) therefore 88% of non-financial companies were considered the analysis. Finally, table 5 also shows that none of the VIF values are higher than 2 and none of the tolerance values are lower than 0.5, therefore no significant multicollinearity exists.

Table 6: Multiple regression analysis (Model 2, 3)

Model (2, 3)	B	t-ratio	Sig	B	t-ratio	Sig
(Constant)	.945	1.065	.290	.951	1.162	.249
Intensity of competitive environment	.085	.784	.436	.135	1.344	.183
Business sector (replication)	-.095	-.859	.393	.002	.021	.984
Technological advanc.	-.125	-.989	.326	-.135	-1.156	.251
Company size (annual sales turnover)	.344	2.719	.008	.338	2.896	.005
Product Diversity	.124	1.219	.227	.344	1.807	.075
Cost Structure (% of indirect costs)	.315	2.479	.015	.414	3.541	.001
Importance of cost information	.469	2.832	.006	.342	2.923	.005
	2. Dependent variable: Cost Centers			3. Dependent variable: Cost Drivers		
	R^2 .384; F 6.861 Sig. 000			R^2 .417; F 7.878 Sig .000		

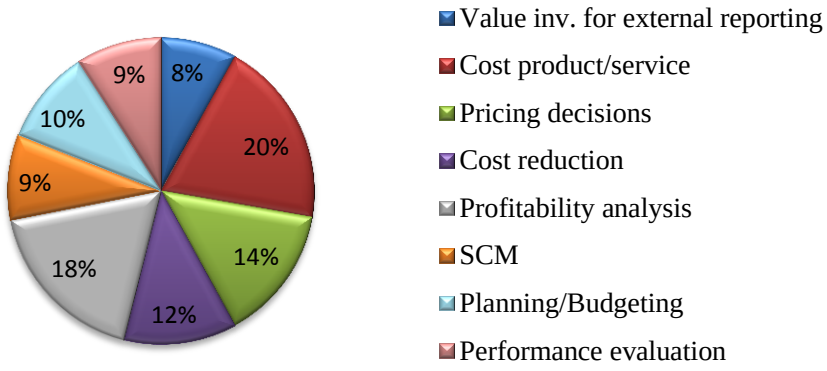
Multiple (linear) regression was used for the 2nd and 3rd model (Table 6), because the dependent variable of each model measures the level of sophistication of costing systems in terms of the number of cost centers and cost drivers. The amount of variation in the level of sophistication of costing systems explained by the contextual factors is statistically significant, with F6.861, $p<.001$, $R^2 = .384$ for the 2nd model and F7.878,

p<.001, R^2 = .417) for the 3rd model. Overall, the results of the two models show that the following contextual factors are statistically significant: Company size *(p<.01),* Cost Structure (*p<.05*), Importance of cost information (p<.01). Dummy variables were excluded because of high p-values.

Other contextual factors were also identified in this WP (Appendix II, Q14) as extremely important for some companies, but were not included in the regression models due to low number of responses. From the 8 Portuguese companies that adopted TCS (in Table 4), 4 were public companies from healthcare sector. These companies mentioned as extremely important factor "the legal enforcement of norms and procedures laid down in the chart of accounts, known as *Plano de Contabilidade Analítica dos Hospitais (PCAH)",* which resulted in the compulsory implementation of homogeneous cost pool method in all hospitals of National Health Service (Carvalho, et al., 2008). Other factor mentioned as extremely important by other respondents from both countries was "the type of costing system adopted/implemented by the international group or agreed with joint venture partner". Additionally, in Q16 of Appendix II, companies also specified that "variety of costing systems were adopted/implemented depending on the particular business unit". This also suggests that organizational structure plays an important role as contextual factor.

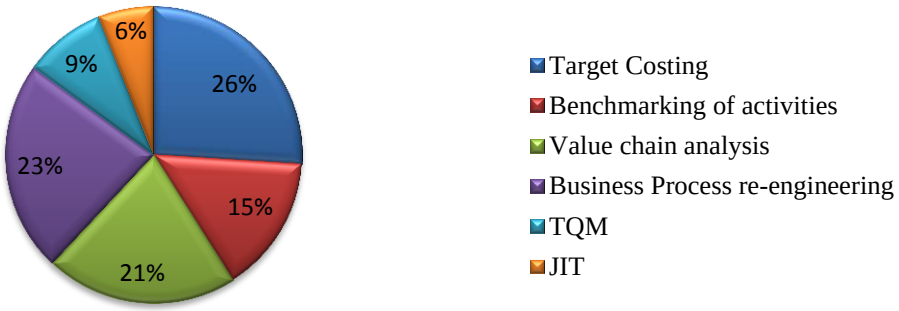
Regarding the importance of cost, the following pie chart illustrates for which strategic decisions the cost information extracted form absorption costing systems, particularly from SCSs, is more important (see Q15 in Appendix II).

Importance of cost information



We can, thus, conclude that cost information is more important to cost product/service, to provide accurate cost data for profitability analysis and for pricing decisions. To support operational decisions, cost information is more useful for target costing, business process re-engineering and value chain analysis as shown below. In fact, 56% of ABC or TDABC adopters (Appendix II, Q18) indicated < 3% of cost reduction achieved and 34% indicated 3%-5% of cost reduction, which according to Drury (2009) and Fei et al. (2008) contributes for the reduction of deviations between actual costs and target costs, as presented in Appendix III.

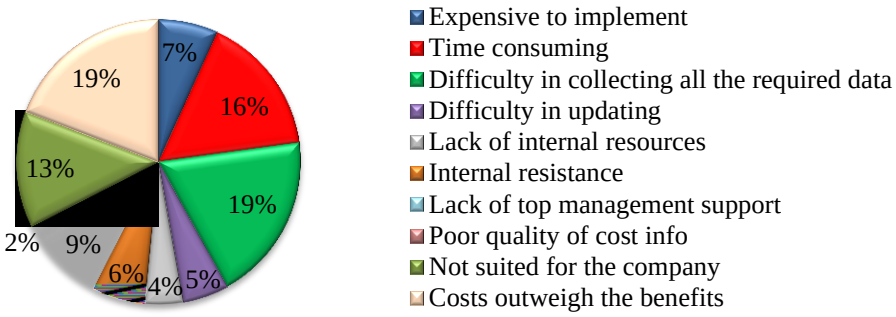
Use of innovative management accounting techniques



Finally, non-ABC adopters[13] referred time consuming, difficulty in collecting all the required data for the implementation and costs outweighing the benefits as the most important reasons (factors) which led them not to adopt/implement ABC or TDABC.

[13] TCS adopters or companies with no formal costing system.

Organizational and Technical factors



Note: In the above pie charts, the responses of the companies operating in Portugal and South Africa were combined not only because they were very similar but also because of the low number of responses due to filter questions which only allowed specific respondents to answer such questions (see Appendix II, e.g. Q17-21).

V. Discussion and Conclusion

The present WP aimed to answer the two research questions formulated in section II, in order to overcome the limitations found in the literature review such as: contradictory empirical findings on the effects of contextual factors in the adoption /design of costing systems as well as the omission of other contextual factors, lack of detailed analysis on the strongest contextual factor – Importance of cost information. As such, the contributions of this WP to practitioners and extant literature on costing system are fourfold. Firstly, by revealing that companies claiming to be SCSs adopters are not only ABC and TDABC adopters, but also TCS adopters with large number of cost centers and cost drivers. Secondly, cost structure which is subject to a lot of inconsistency across previous studies (Abernethy et al., 2001, Ahamadzadeh et al., 2011), was found to be statistically significant factor in this WP. In fact, Table 2 and 4 showed some consistencies on that matter, which we can conclude that companies from the

manufacturing sector still rely in TCS as they have more direct than indirect costs. The same applied to companies from retail sector, which confirmed Waweru et al. (2004)'s findings. In contrast, companies from service sector rely more on ABC and TDABC to manage their activities and to allocate high level of indirect costs to diverse services, this is in line with Atkinson et al. (2012), Innes & Mitchell (1999), Gomes (2004) and Janse van Rensburg et al. (2011).

Additionally, this WP confirmed the findings on the effects of company size and cost information of prior research (Al-Omiri & Drury, 2007; Sartorius, et al., 2007). Secondly, regarding cost information, it was found that companies perceived it as more important for decisions such as costing product/services and pricing decisions, but also to support target costing and business process re-engineering.

But based on the three multiple regression analyses, previously undertaken in this WP, four hypothesis formulated were completely rejected: H2 (innovative management accounting techniques), H3 (product diversity), H5 (technological advancement) and H7(competition). The possible explanations for these non-statistically significant factors are the following: for the case of product diversity specifically, maybe the fact that companies are investing in advanced management technology (AMT) to cope with product diversity, therefore diminishing the need for SCSs (Abernethy et al. 2001); regarding technological advancement, as it became accessible to all companies, it may have lost its relevance as predictor factor (Al-Omiri & Drury, 2007); and lastly, the replication of costing systems within business sector was not confirmed either, because few companies would actually admit that fact. But the influence of the service sector characteristics in the level of sophistication of the costing system, referred by Chea (2011), Everaert & Bruggeman (2007) and Demeere, et al. (2009), was confirmed to be statistically significant in the present WP through dummy variables.

Thirdly, this WP highlighted the importance of other factors omitted in many contingency-based research, for instance Al-Omiri & Drury (2007) and Ahamadzadeh et al. (2011). The first omitted factor proved to be statistically significant was national culture. Despite the convergence effect of globalization leading companies to adopt similar management practices, ABC adoption/implementation rate is slightly higher in Portugal than South Africa (Table 4). This is evidence supports Hofstede's results (appendix VI), which suggest that South African culture is more individualistic and masculine than the Portuguese culture which, on the other hand, shows higher level of power distance, uncertainty avoidance and long term goals. According to Choe & Langfield-Smith (2004), TCS predominate in individualist societies such as South Africa while ABC in collectivist societies with high level on uncertainty avoidance and long term goals. However in the case of Portugal high levels of power distance could have deterred a much higher ABC adoption rate, which explains the slight difference between the two countries. Chenhall (2003) states that companies tend to redesign their costing systems when internationalizing in order to fit with the cultural characteristics of each country. Thus, this WP's finding favours the bilateral trade relations mentioned in previous Section I, therefore adding another element to those that were said to make South African the 2nd easiest economy to do business with in Africa (Doing Business, 2013). Another contextual factor omitted previously, revealed to be important especially for the case of Portuguese companies, which was the impact of Sectorial Plans of Public Accounting in the adoption/implementation of costing systems in specific business sectors such as municipalities, healthcare, education and social welfare. Furthermore, conglomerate/multinational companies surveyed, indicated organizational structure as another important factor in the adoption/implementation of costing system. In fact, there are two main organizational structures that should be taken into account: 1) mechanist structure, where there are formal hierarchy levels and financial decisions and control for

subsidiaries are centralized in the parent company and 2) organic structure where financial decisions and control are decentralized/allocated to each subsidiary and hierarchy levels are lower encouraging more cooperation across levels (Gosselin, 1997; Fei & Isa, 2010; Rugman & Collinson, 2012).These factors should be incorporated in the models of future research studies.

The last contribution of this WP was identifying the main organizational and technical factors that undermined the implementation of SCSs in the targeted countries. The findings of the present WP should be analyzed taking into consideration its limitations. Firstly, low response rate due to the long questionnaire used. Therefore, a multiple case study approach is suggested as further research, involving one company from each business sector[14], so that a more detailed study of this topic can be done. The rankings used listed the largest companies, thus the last direction for further research is that smaller companies should be targeted in order to assess if contextual factors statistically significant in this WP are still significant for smaller companies.

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